

Application No. 09/915,332
Reply to Office Action of March 23, 2005

Patent
Attorney Docket No. 86655-5
(formerly 86177-11)

II. REMARKS/ARGUMENTS

A. Summary of the Amendments

The present application now contains 45 claims¹, numbered 1 to 30, 35 and 38 to 51.

Claims 1, 11, 22, 23, 25, 26, 29 and 35 have been amended to clarify the subject matter being claimed or to correct certain minor informalities detected by the Applicants upon reviewing the application.

Claims 31 to 34, 36 and 37 have been cancelled without prejudice. New claims 48 to 51 have been added to the application.

It is respectfully submitted that no new matter has been added to the application by the present amendment.

¹ Point 4 on page 1 of the Office Action incorrectly indicates that claims 1 to 42 were pending in the application prior to the present amendment. It is respectfully submitted that the application contained 47 claims prior to the present amendment.

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B. Summary of Rejections and Reply

B.1 Rejection of claims 1 to 25, 30, 31, 36, 37 and 42 to 47 under 35 USC 102

On page 2 of the Office Action, the Examiner rejected claims 1 to 25, 30, 31, 36, 37 and 42 to 47 under 35 USC 102(e) as being anticipated by U.S. Patent No. 6,577,634 to Tsukakoshi et al. (hereinafter referred to as "Tsukakoshi").

As described below, the Applicants respectfully submit that claims 1 to 25, 30, 36, 37 and 42 to 47, as effected by the present amendment, are in condition for allowance. The rejections of claims 31, 36 and 37 are moot in view of cancellation of these claims from the application.

Independent claim 1

The Examiner's attention is directed to the following excerpt of claim 1, portions of which have been emphasized:

1. A router supporting multiple routing protocols, comprising:
(...)
- c. a routing layer in communication with said interface layer, said routing layer having at least first and second routing protocol computing entities, each routing protocol computing entity being associated with a distinct subset of at least one routing protocol from a common set of routing protocols and including:
 - i. a CPU;
 - ii. a data storage medium in communication with said CPU;
 - iii. program data stored in said data storage medium for execution by said CPU;
- d. the program data in the data storage medium of each routing protocol computing entity effecting management of one or more peering sessions with remote routing devices according to only the at least one routing protocol in the associated subset, when executed by the CPU of the respective routing protocol computing entity.

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It is respectfully submitted that Tsukakoshi does not teach or suggest first and second routing protocol computing entities each associated with a distinct subset of at least one routing protocol from a common set of routing protocols.

Specifically, Tsukakoshi describes a clustered router 11 in which each of a plurality of routers 12 has a route calculation unit 20. Each route calculation unit 20 implements "two or more routing protocol means 15 which execute routing protocols" (see col. 3, lines 18 to 20). There is absolutely no mention or suggestion of each route calculation unit 20 being associated with a distinct subset of the two or more routing protocols. On the contrary, all of the route calculation units 20 implement the same two or more routing protocols.

Accordingly, Tsukakoshi does not teach or suggest first and second routing protocol computing entities each associated with a distinct subset of at least one routing protocol from a common set of routing protocols, as claimed in claim 1.

In light of the above, it is respectfully submitted that at least one feature of claim 1, as amended, is neither taught nor suggested by Tsukakoshi. Accordingly, it is respectfully believed that claim 1 is in condition for allowance and the Examiner is respectfully requested to withdraw the rejection of this claim.

Dependent claims 2 to 22

Claims 2 to 22 depend either directly or indirectly on claim 1 and therefore include all of the features of claim 1. Hence, for the same reasons as those set forth above in respect of claim 1, the Applicants respectfully submit that claims 2 to 22 are in condition for allowance. The Examiner is therefore respectfully requested to withdraw the rejections of claims 2 to 22.

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Independent claim 23

The Examiner's attention is directed to the following excerpt of claim 23, portions of which have been emphasized:

23. A router, comprising:

(...)

- c. a routing layer in communication with said interface layer, said routing layer having at least first and second routing protocol computing entities, each routing protocol computing entity including:
 - i. a CPU;
 - ii. a data storage medium in communication with said CPU;
 - iii. a program data stored in said data storage medium for execution by said CPU;
- d. the program data in the data storage medium of said first routing protocol computing entity effecting management of one or more peering sessions with remote routing devices according to a first routing protocol, when executed by the CPU of said first routing protocol computing entity;
- e. the program data in the data storage medium of said second routing protocol computing entity effecting management of one or more peering sessions with remote routing devices according to a second routing protocol when executed by the CPU of said second routing protocol computing entity;
- f. the first routing protocol being the same as the second routing protocol;
- g. said management of one or more peering sessions effected by the program data in the data storage medium of said first routing protocol computing entity comprising maintaining in the data storage medium of said first routing protocol computing entity one or more inbound route databases containing route information derived from information received during one or more peering sessions managed by said first routing protocol computing entity;
- h. said management of one or more peering sessions effected by the program data in the data storage medium of said second routing protocol computing entity comprising maintaining in the data storage medium of said second routing protocol computing entity one or more inbound route databases

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containing route information derived from information received during one or more peering sessions managed by said second routing protocol computing entity;

- i. said one or more inbound route databases of said first routing protocol computing entity not containing at least some of the route information contained in said one or more inbound route databases of said second routing protocol computing entity.

It is respectfully submitted that the above-emphasized features are not found in Tsukakoshi.

Specifically, Tsukakoshi describes a clustered router 11 in which each of a plurality of routers 12 has a route calculation unit 20. Each route calculation unit 20 includes a memory 42 storing a routing table 17. Each route calculation unit 20 also includes a network information sharing protocol (NISP) means 14 ensuring that routing information updates received by a routing protocol means 15 of that route calculation unit 20 which executes a given routing protocol are distributed to all other routing protocol means 15 of other route calculation units 20 which execute the same given routing protocol (see col. 3, lines 23 to 27 and 31 to 57; and col. 4, lines 44, 45 and 50 to 52). Thus, the routing tables 17 in all of the route calculation units 20 contain the same routing information for a given routing protocol. In other words, for a given routing protocol, the routing table 17 of a first route calculation unit 20 contains all of the routing information that is contained in the routing table 17 of a second route calculation unit 20 for that same given routing protocol. Simply put, there is duplication across all routing tables 17 in Tsukakoshi. Therefore, it would be incorrect to contend that the routing table 17 of the first route calculation unit 20 does not contain at least some of the routing information contained in the routing table 17 of the second route calculation unit 20 for that given routing protocol.

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In light of the above, it is respectfully submitted that at least one feature of claim 23, as amended, is neither taught nor suggested by Tsukakoshi. Accordingly, it is respectfully believed that claim 23 is in condition for allowance and the Examiner is respectfully requested to withdraw the rejection of this claim.

Dependent claims 24, 25 and 30

Claims 24, 25 and 30 depend either directly or indirectly on claim 23 and therefore include all of the features of claim 23. Hence, for the same reasons as those set forth above in respect of claim 23, the Applicants respectfully submit that claims 24, 25 and 30 are in condition for allowance. The Examiner is therefore respectfully requested to withdraw the rejections of claims 24, 25 and 30.

Independent claim 42

The Examiner's attention is directed to the following excerpt of claim 42, portions of which have been emphasized:

42. A router, comprising:

(...)

c. a routing layer in communication with said interface layer, said routing layer having at least first and second routing protocol computing entities, each routing protocol computing entity including:

- i. a CPU;
- ii. a data storage medium in communication with said CPU;
- iii. a program data stored in said data storage medium for execution by said CPU;

(...)

h. said routing layer including a control computing entity in data communicative relationship with each routing protocol computing entity, said control computing entity including:

- i. a CPU;

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- ii. a data storage medium in communication with the CPU of said control computing entity;
- iii. a master routing table stored in the data storage medium of said control computing entity, said master routing table holding a master routing database derived at least in part from the inbound routing database of said first routing protocol computing entity and from the inbound routing database of said second routing protocol computing entity;
- iv. program data in the data storage medium of said control computing entity for execution by the CPU of said control computing entity to implement a main routing table manager to manage said master routing table;

(...).

It is respectfully submitted that Tsukakoshi does not teach or suggest the above-emphasized features.

Specifically, Tsukakoshi describes a clustered router 11 in which each of a plurality of routers 12 has a route calculation unit 20. Each route calculation unit 20 includes a single processor 41 that implements both (1) routing protocol means 15 executing routing protocols and (2) a network information sharing protocol (NISP) means 14 ensuring distribution of routing information updates received by that route calculation unit 20 to other route calculation units 20 of the clustered router 11. Each route calculation unit 20 further includes a memory 42 storing a local routing table 17 for that route calculation unit 20 (emphasis added, see col. 3, lines 18 to 20, 23 to 27 and 31 to 57; col. 4, lines 44 to 52; and Figure 4).

There is absolutely no mention or suggestion in Tsukakoshi of a distinct "control computing entity" having its own CPU and its own memory which are respectively distinct from the processor 41 executing routing protocols in each route calculation unit 20, whereby this distinct "control computing entity" would (1) communicate with the plurality of route calculation units 20 executing routing protocols and (2) manage a "master routing table" stored in its own memory and derived from the contents of the local routing table 17 in each route calculation unit 20.

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In light of the above, it is believed that claim 42 is in condition for allowance and the Examiner is respectfully requested to withdraw the rejection of this claim.

Dependent claims 43 and 44

Claims 43 and 44 depend directly on claim 42 and therefore include all of the features of claim 42. Hence, for the same reasons as those set forth above in respect of claim 42, the Applicants respectfully submit that claims 43 and 44 are in condition for allowance. The Examiner is therefore respectfully requested to withdraw the rejections of claims 43 and 44.

Independent claim 45

The Examiner's attention is directed to the following excerpt of claim 45, portions of which have been emphasized:

45. A router, comprising:

(...)

c. a routing layer in communication with said interface layer, said routing layer having at least first and second routing protocol computing entities, each routing protocol computing entity including:

- i. a CPU;
- ii. a data storage medium in communication with said CPU;
- iii. a program data stored in said data storage medium for execution by said CPU;

(...)

h. said routing layer including a control computing entity in data communicative relationship with each routing protocol computing entity, said control computing entity including:

- i. a CPU;
- ii. a data storage medium in communication with the CPU of said control computing entity;

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- iii. a master routing table stored in the data storage medium of said control computing entity, said master routing table holding a master routing database derived at least in part from the inbound routing database of said first routing protocol computing entity and from the inbound routing database of said second routing protocol computing entity;
- iv. program data in the data storage medium of said control computing entity for execution by the CPU of said control computing entity to implement a main routing table manager to manage said master routing table;

(...).

The Examiner will appreciate that the above-emphasized features of claim 45 are similar to the ones discussed previously in respect of claim 42.

Accordingly, for the same reasons as those set forth above in respect of claim 42, it is respectfully submitted that Tsukakoshi does not teach or suggest the aforementioned features.

In light of the above, it is believed that claim 45 is in condition for allowance and the Examiner is respectfully requested to withdraw the rejection of this claim.

Dependent claims 46 and 47

Claims 46 and 47 depend directly on claim 45 and therefore include all of the features of claim 45. Hence, for the same reasons as those set forth above in respect of claim 45, the Applicants respectfully submit that claims 46 and 47 are in condition for allowance. The Examiner is therefore respectfully requested to withdraw the rejections of claims 46 and 47.

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B.2 Rejection of claims 26 to 29 and 32 to 34² under 35 USC 103

On page 27 of the Office Action, the Examiner rejected claims 26 to 29 and 32 to 34² under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,577,634 to Tsukakoshi et al. (hereinafter referred to as "Tsukakoshi") in view of "Evaluation of Border Gateway Protocol (BGP) Version 4 (V4) in the Tactical Environment" by Gobrial, IEEE, 1996 (hereinafter referred to as "Gobrial").

As described below, the Applicants respectfully submit that claims 26 to 29, as effected by the present amendment, are in condition for allowance. The rejections of claims 32 to 34 are moot in view of the cancellation of these claims from the application

Dependent claims 26 to 29

Claims 26 to 29 depend indirectly on claim 23 and therefore include all of the features of claim 23. This includes the features already shown in respect of claim 23 to be neither taught nor suggested by Tsukakoshi, namely: first and second routing protocol computing entities each including a CPU, a data storage medium in communication with the CPU, and program data stored in the data storage medium for execution by the CPU, and where:

- the program data in the data storage medium of the first routing protocol computing entity maintains in that data storage medium one or more inbound route databases containing route information derived from information received during one or more peering sessions managed by the first routing protocol computing entity according to a first routing protocol, when executed by the CPU of the first routing protocol computing entity;
- the program data in the data storage medium of the second routing protocol computing entity maintains in that data storage medium one or more inbound route databases containing route information derived from information received during one or more peering sessions managed by the second routing protocol computing entity

² Point 33 on page 27 indicates that claims "32-35" are rejected. However, it is noted that, on pages 28 to 32, only claims 32 to 34 are rejected as being unpatentable over Tsukakoshi in view of Gobrial, while claim 35 is rejected at point 40 on page 32 based on a different combination of references.

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- according to a second routing protocol that is the same as the first routing protocol, when executed by the CPU of the second routing protocol computing entity; and
- the one or more inbound route databases of the first routing protocol computing entity do not contain at least some of the route information contained in the one or more inbound route databases of the second routing protocol computing entity.

It is respectfully submitted that Gobrial also fails to teach or suggest the above-emphasized features of claim 23 (and thus of dependent claims 26 to 29) already shown to be missing from Tsukakoshi.

In light of the above, it is respectfully submitted that at least one feature of each of claims 26 to 29 (by virtue of their dependency on claim 23) is neither taught nor suggested by the cited references, whether taken separately or in combination. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j)³ is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 26 to 29 and it is respectfully submitted that these claims are in condition for allowance.

³ For the Examiner to establish a *prima facie* case of obviousness, three criteria must be considered: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings, (2) there must be a reasonable expectation of success, and (3) the prior art references must teach or suggest all of the claim limitations. MPEP §§ 706.02(j), 2142 (8th ed.).

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B.3 Rejection of claim 35 under 35 USC 103

On page 32 of the Office Action, the Examiner rejected claim 35 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,577,634 to Tsukakoshi et al. (hereinafter referred to as "Tsukakoshi") in view of "Secure Border Gateway Protocol (S-BGP)" by Kent et al., IEEE Journal on Selected Areas in Communications, Vol. 18, No.4, April, 2000 (hereinafter referred to as "Kent").

As described below, the Applicants respectfully submit that claim 35, as effected by the present amendment, is in condition for allowance.

Independent claim 35

Claim 35 has been cast in independent form by amending it to include the features of former independent claim 31, which is now cancelled.

The Examiner's attention is directed to the following excerpt of claim 35, portions of which have been emphasized:

1. A router comprising:
 - a. an interface layer including a plurality of I/O controllers, each I/O controller implementing an I/O port;
 - b. a switching layer in communication with said interface layer for selectively establishing signal pathways between said I/O ports;
 - c. a routing layer in communication with said interface layer, said routing layer being capable of managing at least one peering session with a remote routing device, the peering session including the exchange of messages with the remote routing device through one of the I/O controllers, the peering session being comprised of a plurality of tasks;
 - d. the one I/O controller implementing a peering session assist module,
 - e. said peering session assist module being capable of performing some of the tasks of the peering session autonomously from said routing layer;

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- f. said routing layer being capable of performing tasks of the peering session other than the tasks performed by the peering session assist module;
wherein the tasks performed by the peering session assist module include authenticating messages received from the remote routing device.

It is respectfully submitted that the Examiner has failed to show that Tsukakoshi and Kent, whether taken separately or in combination, teach or suggest an I/O controller of an interface layer of a router that is capable of authenticating messages received from a remote routing device during a peering session with a routing layer of the router.

Specifically, Tsukakoshi describes a router 12 having a plurality of forwarding units 18 for exchanging packets with external routers 25 (see col. 4, lines 53 to 64 and Figure 4). However, as conceded by the Examiner, Tsukakoshi does not disclose that the forwarding units 18 perform authentication of received packets. Clearly, therefore, Tsukakoshi cannot be held to teach or suggest the claimed I/O controller of an interface layer of a router that is capable of authenticating messages received from a remote routing device during a peering session with a routing layer of the router.

Turning now to Kent, the Examiner contends that this reference "teaches Secure Border Gateway Protocol that provides authorization at the higher protocol level [and that] at the forwarding unit it will check if the peer that sent the update was authorized to act on behalf of its Autonomous State (AS)". The Examiner further contends that "[i]t is much cheaper and secure to implement the authentication at the I/O layer/Forwarding unit."

To support this contention, the Examiner refers to specific passages of Kent, namely the "Abstract" and "B. Correct Operation of BGP" sections on page 582 of Kent. These passages of Kent solely refer to authentication of routing information by a "BGP speaker". The Examiner will appreciate that a "BGP speaker" is simply a system (such as a network node) running BGP. There is no discussion in these passages of specific components making up a "BGP speaker" and certainly no discussion of specific functionality of such components. In particular, there is no mention of forwarding units and their functionality. Therefore, it is

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incorrect for the Examiner to state that these passages of Kent teach forwarding units performing authentication since these passages do not even discuss forwarding units.

Accordingly, it is respectfully submitted that the Examiner has failed to show that Kent teaches or suggests the claimed I/O controller of an interface layer of a router that is capable of authenticating messages received from a remote routing device during a peering session with a routing layer of the router.

In light of the above, it is respectfully submitted that the Examiner has not established a *prima facie* case of obviousness in accordance with MPEP 706.02(j). Hence, the Examiner is respectfully requested to withdraw the rejection of claim 35 and it is respectfully submitted that this claim is in condition for allowance.

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B.4 Rejection of claims 38 and 41 under 35 USC 103

On page 33 of the Office Action, the Examiner rejected claims 38 and 41 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,577,634 to Tsukakoshi et al. (hereinafter referred to as "Tsukakoshi") in view of U.S. Patent No. 6,049,524 to Fukushima et al. (hereinafter referred to as "Fukushima").

As described below, the Applicants respectfully traverse the Examiner's rejection and respectfully submit that claims 38 and 41 are in condition for allowance.

Independent claim 38

The Examiner's attention is directed to the following excerpt of claim 38, portions of which have been emphasized:

38. A router, comprising:
- a. an interface layer including a plurality of I/O controllers, each I/O controller implementing an I/O port;
 - b. a switching layer in communication with said interface layer for selectively establishing signal pathways between said I/O ports;
 - c. a routing layer in communication with said interface layer;
 - d. each I/O controller implementing an LSA entity, said LSA entity including an LS database, said LSA entity being responsive to an LSA message from a remote routing device including LS information to:
 - i. update said LS database;
 - ii. forward the LS information to said routing layer;
 - iii. forward the LS information to at least another I/O controller of said interface layer.

It is respectfully submitted that Tsukakoshi and Fukushima, whether taken separately or in combination, do not teach or suggest each I/O controller of an interface layer of a router that implements an LSA entity, where this LSA entity includes an LS database and is responsive to an LSA message from a remote routing device including LS information to:

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- update the LS database;
- forward the LS information to a routing layer of the router;
- forward the LS information to at least another I/O controller of the interface layer.

Specifically, as conceded by the Examiner on page 34 of the Office Action, Tsukakoshi "fails to expressly disclose that the routing protocol implemented in the route calculating entity can be the Link State protocol." It is therefore not surprising that Tsukakoshi contains absolutely no mention or suggestion of a forwarding unit implementing an LSA entity including an LS database and having the updating and forwarding functionality claimed in claim 1.

Furthermore, Fukushima also fails to teach or suggest this feature of claim 38 that is missing from Tsukakoshi. Specifically, while Fukushima indeed describes an LS database 22, this LS database 22 is clearly maintained in the route calculation unit 11, i.e. in the routing layer, of Fukushima's router 10. Therefore, it is abundantly clear that the LS database 22 is not maintained in Fukushima's forwarding process units 13, i.e. in Fukushima's interface layer (see col. 5, lines 60 to 67; col. 6, lines 1 to 4; and Figure 2). Accordingly, Fukushima (like Tsukakoshi) fails to teach or suggest the above-emphasized features of claim 38.

In light of the above, it is respectfully submitted that at least one feature of claim 38 is neither taught nor suggested by the cited references, whether taken separately or in combination. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 38 and it is respectfully submitted that this claim is in condition for allowance.

Dependent claim 41

Claim 41 depends directly on claim 38 and therefore include all of the features of claim 38. Hence, for the same reasons as those set forth above in respect of claim 38, the Applicants respectfully submit that claim 41 is in condition for allowance. The Examiner is therefore respectfully requested to withdraw the rejection of claim 41.

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B.5 Rejection of claims 39 and 40 under 35 USC 103

On page 36 of the Office Action, the Examiner rejected claims 39 and 40 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,577,634 to Tsukakoshi et al. (hereinafter referred to as "Tsukakoshi") in view of U.S. Patent No. 6,049,524 to Fukushima et al. (hereinafter referred to as "Fukushima") and in further view of U.S. Patent No. 6,820,134 to Zinin et al. (hereinafter referred to as "Zinin").

As described below, the Applicants respectfully traverse the Examiner's rejection and respectfully submit that claims 39 and 40 are in condition for allowance.

Dependent claims 39 and 40

Claims 39 and 40 depend either directly or indirectly on claim 38 and therefore include all of the features of claim 38.

As already shown in respect of claim 38, Tsukakoshi and Fukushima, whether taken separately or in combination, do not teach or suggest each I/O controller of an interface layer of a router that implements an LSA entity, where this LSA entity includes an LS database and is responsive to an LSA message from a remote routing device including LS information to:

- update the LS database;
- forward the LS information to a routing layer of the router;
- forward the LS information to at least another I/O controller of the interface layer.

Furthermore, Zinin also fails to teach or suggest this feature of claim 38 (and thus of claims 39 and 40) that is missing from Tsukakoshi and Fukushima. Specifically, while Zinin describes a link state database 220, this link state database 220 is clearly not maintained in any of Zinin's network interfaces 210A to 210D, i.e., in Zinin's interface layer (see col. 6, lines 31 to 34 and Figure 2).

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Accordingly, Zinin (like Tsukakoshi and Fukushima) fails to teach or suggest each I/O controller of an interface layer of a router that implements an LSA entity, where this LSA entity includes an LS database and is responsive to an LSA message from a remote routing device including LS information to:

- update the LS database;
- forward the LS information to a routing layer of the router;
- forward the LS information to at least another I/O controller of the interface layer.

In light of the above, it is respectfully submitted that at least one feature of each of claims 39 and 40 (by virtue of their dependency on claim 38) is neither taught nor suggested by the cited references, whether taken separately or in combination. Therefore, the Applicants respectfully submit that at least one criterion required for establishing a *prima facie* case of obviousness in accordance with MPEP 706.02(j) is not satisfied. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 39 and 40 and it is respectfully submitted that these claims are in condition for allowance.

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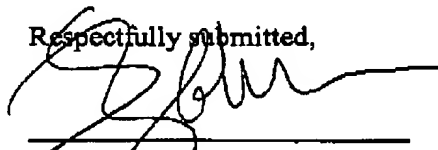
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III. CONCLUSION

In view of the foregoing, the Applicants are of the view that claims 1 to 30, 35 and 38 to 51 are in condition for allowance. Favorable reconsideration is requested. Early allowance of the application is earnestly solicited.

If the application is not considered to be in full condition for allowance, for any reason, the Applicants respectfully request the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03 so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,



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